

STATIC COMPONENT OF PHOTOTHERMAL RESPONSE IN NON-TRANSPARENT SAMPLES *

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Abstract: *The paper presents the analysis of the static component of temperature distribution in non-transparent samples during photothermal measurements. Analytical expressions for static part of temperature distribution in the irradiated sample and in its surroundings are determined using one dimensional model of heat transfer in a typical photothermal environment. It is established that the dominant factors that influence the shape and the mean value of the temperature distribution are optical absorption coefficient and thermal conductances of the sample and the surroundings. Important special cases are described and analytical expressions for temperatures of the front and the back side of the sample are derived.*

Key words: *photothermal effect, non-destructive characterization*

1. INTRODUCTION

Photothermal (in the following text abbreviated as PT) effect comprises generation of heat in a sample irradiated by light. Measurement techniques based on PT effect are being studied and applied as an alternative non-destructive tool for measurement of thermal, optical and other related physical properties, especially when standard methods are not applicable [1-4]. Besides, the PT measurement techniques are increasingly used for investigations of subsurface structure and macroscopic defects [1-6].

PT methods are based on direct or indirect recording of the surface temperature variations, which are caused by generation and transfer of heat that is produced as consequence of absorption of light. Usual sources of light are harmonically modulated beams of ordinary light sources or pulse laser beams [1-14], and the resulting temperature variation,

Received November 20, 2012

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* **Acknowledgement:** The authors wish to acknowledge the support of the Ministry of Education, Science and Technology Development of the Republic of Serbia through research projects TR37020 and III45005, as well as through the projects within the Cooperation Agreement between the JINR, Dubna, Russian Federation and the Ministry of Education, Science and Technology Development of the Republic of Serbia.

